

Claims

[c1] We claim as our invention:

1. A putter comprising:

a club head comprising

a face portion having a recess with a face insert disposed therein,

a sole portion extending rearward from the face portion, the sole portion having an internal surface and an external surface, the internal surface of the sole having a visible heel section and a visible toe section,

an aft mass portion rearward from the face portion a distance of between 2.5 inches to 4.5 inches,

a crown portion extending rearward from the face portion, the crown portion having a central elongated section extending over the aft mass portion and a forward section having a width from a heel end of the face portion to a toe end of the face portion from between 3.0 inches to 5.0 inches, the forward section having a width greater than a width of the central elongated portion; and

a shaft connected to the club head,

wherein the putter has a swing static imbalance, S_y ,

greater than 500 grams-centimeter, the swing static im-

balance defined as the product of the putter mass and the offset distance of the center of gravity of the club head behind the golfer's hands along the target direction.

- [c2] 2. The putter according to claim 1 wherein the putter has a torsion swing inertia, I_{xz} , that has an absolute value greater than 10,000 grams-centimeter square, wherein the torsion swing inertia is defined as the product of inertia of the angular acceleration about the shaft axis and the angular acceleration about the swing axis.
- [c3] 3. The putter according to claim 1 wherein the putter has a center of gravity located at least 1.5 centimeters rearward from a shaft axis of the putter.
- [c4] 4. The putter according to claim 1 wherein the club head has at least 70 percent of its mass located in a center section.
- [c5] 5. A putter comprising:
 - a club head comprising
 - a face portion,
 - a crown portion having a front section and a central elongated section extending rearward from the front section, the front section having a width from a heel end of the putter-type club head to a toe end of the putter-

type club head ranging from 3.0 inches to 5.0 inches, the central elongated section having a width ranging from 1.0 inch to 3.0 inches, the front section having a width greater than a width of the central elongated section,

a sole portion extending rearward from the face portion, an aft mass portion disposed at a rearward end of the sole portion, and

wherein the putter-type club head has length from the face portion to a rearward most end of the aft mass portion ranging from 2.5 inches to 4.5 inches; and

a shaft connected to the club head,

wherein the putter has a torsion swing inertia, I_{xz} , that has an absolute value greater than 10,000 grams-centimeter square, wherein the torsion swing inertia is defined as the product of inertia of the angular acceleration about the shaft axis and the angular acceleration about the swing axis.

- [c6] 6. A putter comprising:
- a club head comprising
 - a face portion,
 - a crown portion having a front section and a central elongated section extending rearward from the front section, the front section having a width from a heel end of the putter-type club head to a toe end of the putter-

type club head ranging from 3.0 inches to 5.0 inches, the central elongated section having a width ranging from 1.0 inch to 3.0 inches, the front section having a width greater than a width of the central elongated section,

a sole portion extending rearward from the face portion, an aft mass portion disposed at a rearward end of the sole portion, and

wherein the putter-type club head has length from the face portion to a rearward most end of the aft mass portion ranging from 2.5 inches to 4.5 inches; and

a shaft connected to the club head,

wherein the putter has a center of gravity located at least 1.5 centimeters rearward from a shaft axis of the putter.

- [c7] 7. A putter comprising:
- a club head comprising
- a body having a face portion, a crown portion, a sole portion and an aft-mass portion, wherein the face portion, the crown portion, the sole portion and the aft-mass portion define a central aperture through the body having a heel end opening and a toe end opening,
- wherein the crown portion extends rearward from the face portion to over the aft-mass portion, wherein the sole portion extends from face portion to the aft-mass portion, and wherein the central aperture separates the

crown portion from the sole portion and the face portion from the aft-mass portion; and
a shaft connected to the club head,
wherein the club head has at least 70 percent of its mass located in a center section.

- [c8] 8. A putter comprising:
a club head comprising
a face portion having a recess with a face insert disposed therein,
a sole portion extending rearward from the face portion, the sole portion having an internal surface and an external surface, the internal surface of the sole having a visible heel section and a visible toe section,
an aft mass portion rearward from the face portion a distance of between 2.5 inches to 4.5 inches,
a crown portion extending rearward from the face portion, the crown portion having a central elongated section extending over the aft mass portion and a forward section having a width from a heel end of the face portion to a toe end of the face portion from between 3.0 inches to 5.0 inches, the forward section having a width greater than a width of the central elongated portion,
and
an alignment means disposed on an external surface of the crown portion,

a shaft connected to the club head; and
a grip attached to the shaft,
wherein the club head has at least 70 percent of its mass
located in a center section.

- [c9] 9. A putter comprising:
a club head comprising
a face portion,
a crown portion having a front section and a central
elongated section extending rearward from the front
section, the front section having a width from a heel end
of the putter-type club head to a toe end of the putter-
type club head ranging from 3.0 inches to 5.0 inches,
the central elongated section having a width ranging
from 1.0 inch to 3.0 inches, the front section having a
width greater than a width of the central elongated sec-
tion,
a sole portion extending rearward from the face portion,
an aft mass portion disposed at a rearward end of the
sole portion, and
an alignment means disposed on an external surface of
the crown portion,
wherein the putter-type club head has length from the
face portion to a rearward most end of the aft mass por-
tion ranging from 2.5 inches to 4.5 inches;
a shaft connected to the club head; and

a grip attached to the shaft,
wherein the club head has at least 70 percent of its mass
located in a center section.